CAM-0100 Series
Communication Appliance

User's Manual

Revision: 1.2

CE

This certificate of conformity of CAM-0100 series with actual required safety standards in accordance with 89/366 ECC-EMC Directive and LVD 73/23 ECC

UL

This product meets all safety requirements per UL60950 standard.

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TÜV CERT ISO 9001

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Chapter 1 Introduction

1.1 About This Manual

This manual contains all required information for setting up and using the CAM-0100 series.

CAM-0100 provides the essential platform for delivering optimal performance and functionality in the value communications appliance market segment. This manual should familiarize you with CAM-0100 operations and functions.CAM-0100-7616 series provide up to 2 on-board Ethernet ports and 1 switch with 4 ports to serve communication applications like Firewall, requiring 2 Ethernet ports to connect external network (internet), demilitarized zone and internal network.

CAM-0100 series overview:

- ✧ Octeon 5020 500 MHz up to 2 Cores
- ✧ Memory: One DDR2 32bit SODIMM slot and up to 1G
- ✧ Two Gigabit Ethernet interfaces with one Bypass segments
- ✧ Independent management console(RS232) and Ethernet interface for MIPS64 system
- ✧ One min-PCI socket for mini-PCI device connectivity.
- ✧ One 2.5” SATA Hard disk

1.2 Manual Organization

This manual describes how to configure your CAM-0100 system to meet various operating requirements. It is divided into three chapters, with each chapter addressing the basic concept and operation of this system.

Chapter 1: Introduction. This section describes how this document is organized. It includes brief guidelines and overview to help find necessary information.

Chapter 2: Hardware Configuration Setting and Installation. This chapter demonstrated the hardware assembly procedure, including detailed information. It shows the definitions and locations of Jumpers and Connectors that can be used to configure the system.

Chapter 3: Operation Information. This section provides illustrations and information on the system architecture and how to optimize its performance.

Any updates to this manual, would be posted on the web site:

http://www.cas-well.com/products/index.php

1.3 Technical Support Information

Users may find helpful tips or related information on Caswell's web site: http://www.cas-well.com A direct contact to Caswell's technical person is also available. For further support, users may also contact Caswell’s headquarter in Taipei or local distributors.

Taipei Office Phone Number: +886-2-5591-1999

1.4 Board Layout

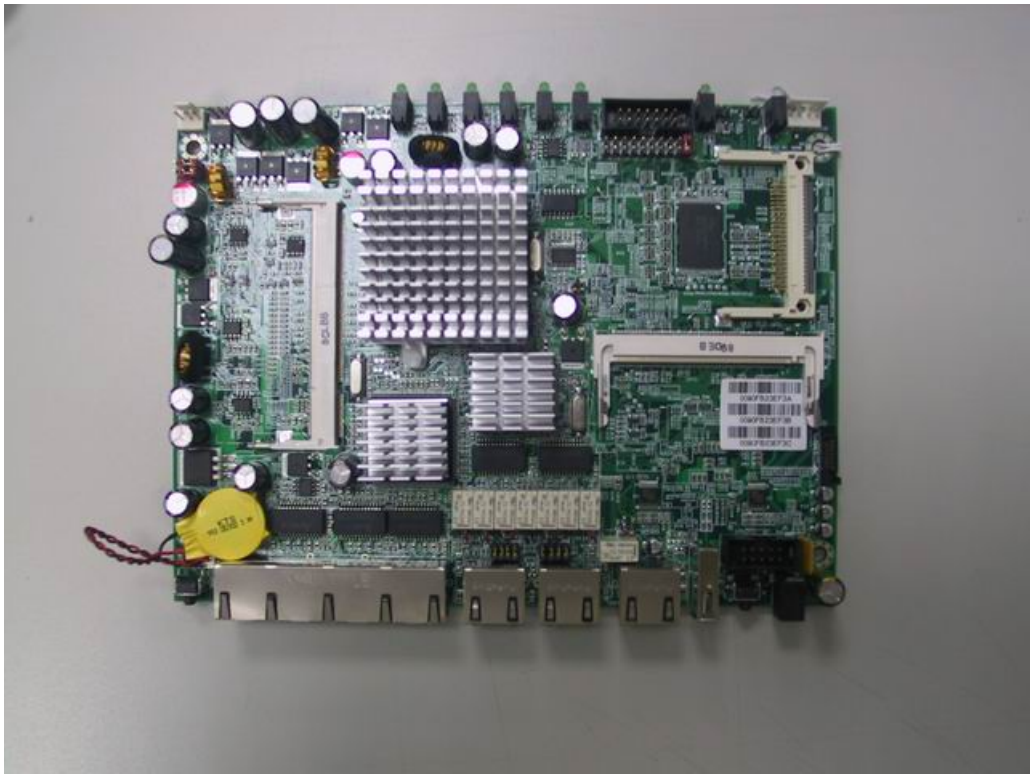


Figure 1-1 Board Layout of CAM-0100 M/B

1.5 System Block Diagram

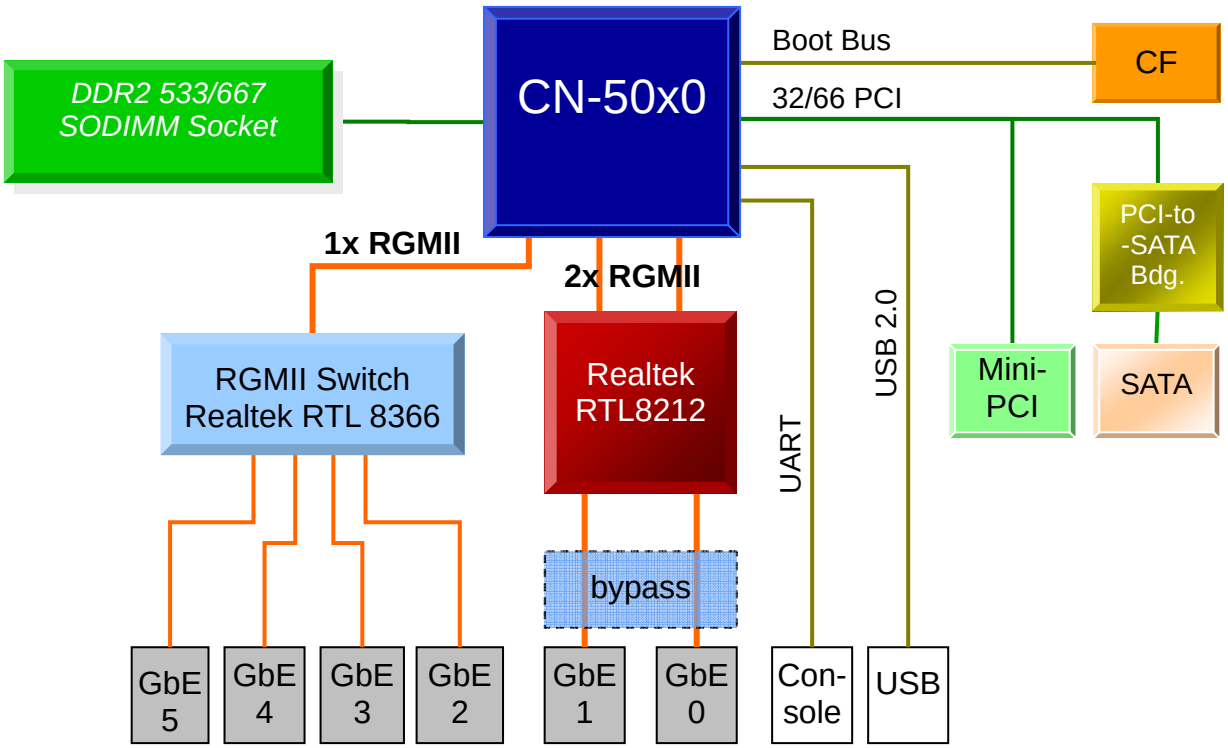


Figure 1-2 CAM-0100 Basic Block Diagram

1.6 Product Specification

	Feature	Detailed Description
1	Processor	■ Cavium Octeon CN-5010/-5020 series ■ Single and Dual MIPS64, L2 Cache128KB, Frequency 500Mhz.
2	Memory Support	■ 1x 200pin DDR2 32bit* SODIMM socket support DDR2 533/667 Max. Capacity up to 1GB
3	Bypass Ethernet ports	■ Two Gigabit Ethernet ports with 1 bypass segments from RGMII interface of Octeon CN50xx with Realtek RTL8212 Ethernet PHY.
4	CF slot	■ One CF slot for Operating system
5	SATA channels	■ SATA channel for2.5" HDD connection
6	MiniPCI interface	■ One Mini-PCI connector on board
7	USB	■ Support USB 2.0.
8	Ethernet ports	■ 2 Gigabit Ethernet port (copper) from 50XX RGMII on CPU board. ■ 1 Gigabit Ethernet port connect to a 4 ports Gigabit switch chip (RTL8366)
9	H/W Reset and Load Factory Default buttons	■ There is a push button for H/W reset ■ There is a l push button for F/D (Load Factory Default).
10	LED	■ 1 * Power LED (Green) – in front ■ 1 * Data Activity (Red). – in front
11	System H/W Monitoring	■ The system will monitor CPU & System Temperature and operating voltage
12	Watch Dog Timer	■ The WDT support 8 time-out intervals from 0.5 sec/Min to 64 sec/Max by s/w programming.
13	System Dimension	■ 1U height, A5 size 210 (W) x 44 (H) x 148.5 (D) mm / 8.27" (W) x 1.73" (H) x 5.85" (D)
14	Environmental requirements	■ Storage temp.: -20°C to 75°C ■ Operating temp.: 0°C to 40°C. ■ Humidity: 10 to 90% RH non-condensing

*Note: If insert 64 bit standard SODIMM, system can boot but memory will only detect half size

System Feature Table

System Model	CPU	RGMII GbE Ports	RGMII GbE S/W ports	Bypass Segment	USB	CF	Mini PCI	SATA	Fanless
CAM-**0100**-761**1**	5010-500BG564-SCP	2	4	1	1	S	S	S	--
CAM-0100-7621		2	4	--	1	S	--	--	S
CAM-**0100**-761**6**	5020-500BG564-SCP	2	4	1	1	S	S	S	--
CAM-0100-7626		2	4	--	1	S	--	--	S

*S: Support

Chapter 2 Getting Started

This section describes how the hardware installation and system settings should be done.

2.1 Included Hardware

The following hardware is included in package:

- CAM-0100 Communication Appliance System Board
- One null serial port cable

2.2 Before You Begin

To prevent damage to any system board, it is important to handle it with care. The following measures are generally sufficient to protect your equipment from static electricity discharge:

When handling the board, use a grounded wrist strap designed for static discharge elimination and touch a grounded metal object before removing the board from the antistatic bag. Handle the board by its edges only; do not touch its components, peripheral chips, memory modules or gold contacts.

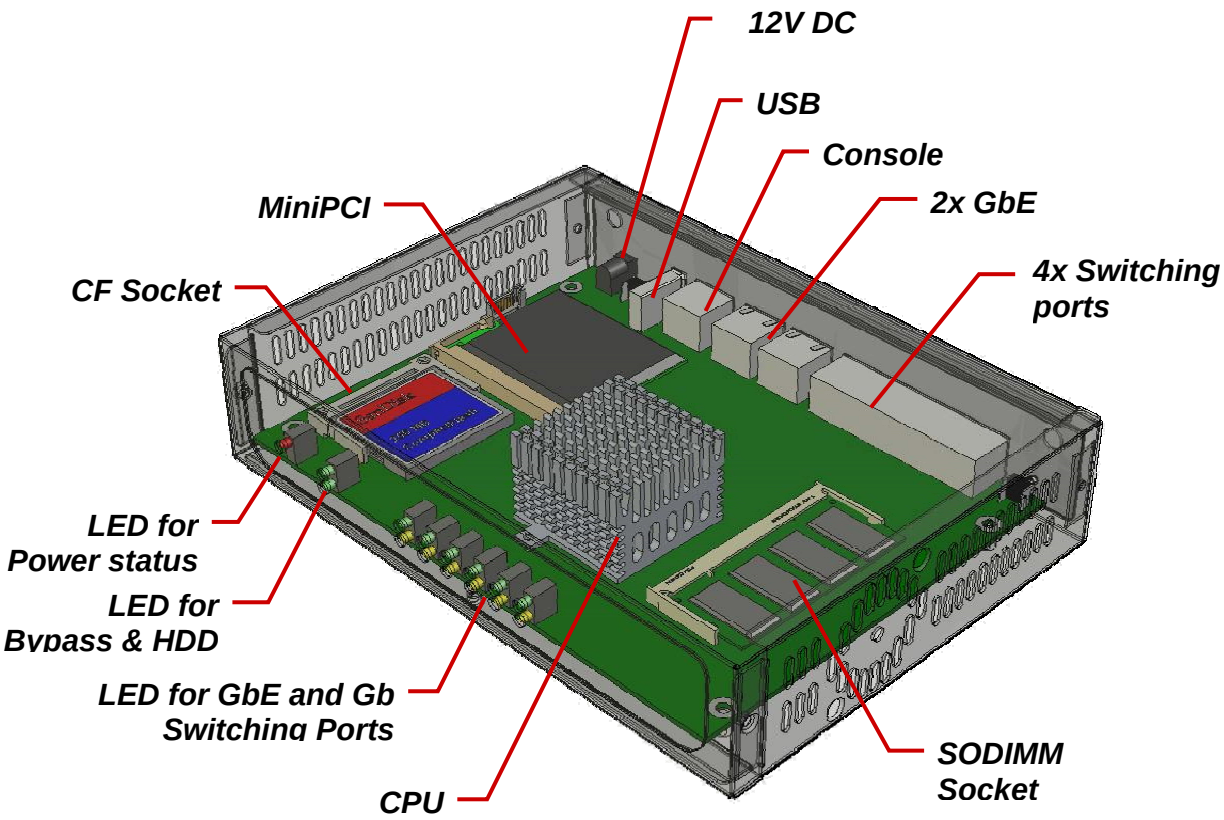
When handling processor chips or memory modules, avoid touching their pins or gold edge fingers. Restore the communications appliance system board and peripherals back into the antistatic bag when they are not in use or not installed in the chassis.

Some circuitry on the system board can continue operating even though the power is switched off. Under no circumstances should the Lithium battery cell used to power the real-time clock be allowed to be shorted. The battery cell may heat up under these conditions and present a burn hazard.

WARNING!

1. **"CAUTION: DANGER OF EXPLOSION IF BATTERY IS INCORRECTLY REPLACED. REPLACE ONLY WITH SAME OR EQUIVALENT TYPE RECOMMENDED BY THE MANUFACTURER. DISCARD USED BATTERIES ACCORDING TO THE MANUFACTURER'S INSTRUCTIONS"**
2. **This guide is for technically qualified personnel who have experience installing and configuring system boards. Disconnect the system board power supply from its power source before you connect/disconnect cables or install/remove any system board components. Failure to do this can result in personnel injury or equipment damage.**
3. **Avoid short-circuiting the lithium battery; this can cause it to superheat and cause burns if touched.**
4. **Do not operate the processor without a thermal solution. Damage to the processor can occur in seconds.**
5. **Do not block air vents. Minimum 1/2-inch clearance required.**

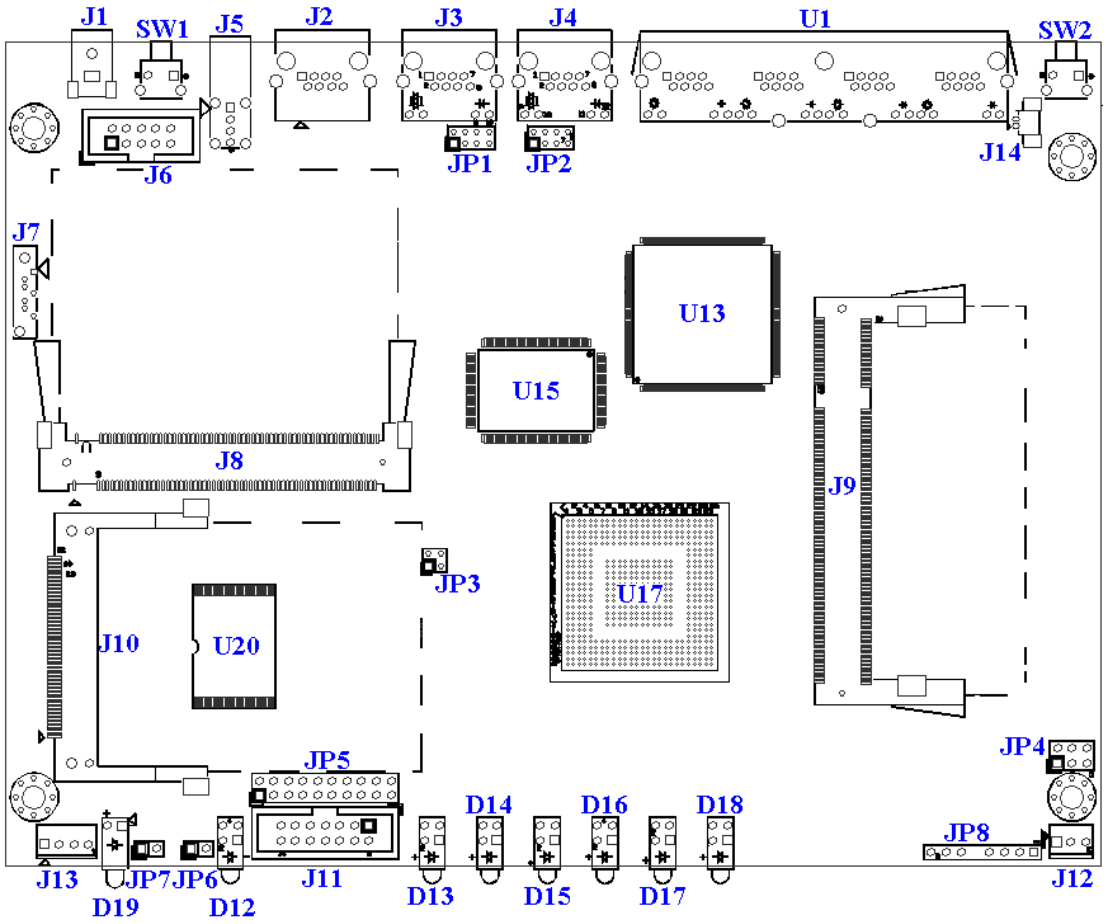
2.3.1 CAM-0100 System



2.3.2 CAM-0100 System Board Jumper

In general, jumpers on CAM-0100 system board are used to select options for certain features. Some of the jumpers are configurable for system enhancement. The others are for testing purpose only and should not be altered. To select any option, cover the jumper cap over (Short) or remove (NC) it from the jumper pins according to the following instructions. Here NC stands for “Not Connected”.

Location of Jumpers



■ JP1、JP2: Bypass and Open Mode Selection

Pin	Function
JP1(1-2),JP2(1-2) Short	Bypass Mode ★
JP1(3-4),JP2(3-4) Short	
JP1(5-6),JP2(5-6) Short	
JP1(7-8),JP2(7-8) Short	
JP1(1-2),JP2(1-2) Open	Open Mode
JP1(3-4),JP2(3-4) Open	
JP1(5-6),JP2(5-6) Open	
JP1(7-8),JP2(7-8) Open	

■ JP3: CASEOPEN Detection and External Thermal Sensor

Pin	Signal Name	Pin	Signal Name
1	GND	2	CASEOPEN (from W83792G)
3	VTIN3 (from W83792G)	4	MGND

■ JP4: Bypass and Normal Mode Selection

Pin	Signal Name	Pin	Signal Name
1	VDD_3V	2	N.C
3	MODE_SEL	4	WDT_STATUS
5	GND	6	GND

Pin	Function
1-3, 2-4 Short	Power on Default at Normal Mode , Mode Selection is S/W Programmable ★
3-5, 2-4 Short	Power on Default at Bypass Mode , Mode Selection is S/W Programmable
4-6 Short	Always at Normal Mode

■ JP5: GPIO、TWSI and SMI Signals Pin Header from CAVIUM

Pin	Signal Name	Pin	Signal Name
1	OCT_GPIO_0	2	GND
3	OCT_GPIO_1	4	OCT_GPIO_17
5	OCT_GPIO_3	6	OCT_GPIO_18
7	OCT_GPIO_12	8	OCT_GPIO_19
9	OCT_GPIO_13	10	OCT_GPIO_20
11	OCT_GPIO_14	12	OCT_GPIO_21
13	OCT_GPIO_15	14	OCT_GPIO_22
15	OCT_GPIO_16	16	OCT_GPIO_23
17	TWS_SCL	18	MDI_MDC
19	TWS_SDA	20	MDI_MDIO

JP5: Bootloader Mode Selection

Pin	Function
1-2 Short	Normal Mode ★
1-2 Open	Failsafe Mode

■ JP6: Watchdog Timer Reset

Pin	Function
1-2 Short	Enable WDT Reset (When WDT Expires) ★
1-2 Open	Disable WDT Reset

■ JP7: Reset to Default Function

Pin	Function
1-2 Short	Reset to Default
1-2 Open	Normal Mode ★

■ JP8: Lattice JTAG (Bypass CPLD Program Header)

Pin	Signal Name
1	VDD_5V
2	WDT_TDO
3	WDT_TDI
4	GND
5	X
6	WDT_TMS
7	GND
8	WDT_TCK

Connector	Function	Remark
J1	DC Power Jack (12V)	
J2	Console Port	
J3	RGMII LAN Port 0	
J4	RGMII LAN Port 1	
J5	USB Connector	
J6	COM2 Pin Header	
J7	SATA Connector	
J8	MiniPCI Socket	
J9	DDR2 DIMM Slot	
J10	CF Socket	
J11	CAVIUM JTAG	
J12	System FAN Connector	
J13	+5V & +12V Power Connector (Only Output)	
J14	Battery Connector	
U1	RGMII Switch LAN Port 0~3	
SW1	System Reset Button	
SW2	Reset to Default Button	
D12	Power LED + HDD LED	
D13~D18	LAN LED	
D19	Bypass LED	

■ J6: COM2 Pin Header

Pin	Signal Name	Pin	Signal Name
1	TP_RS232_1_DCD	2	TP_RS232_1_DSR
3	RS232_1_RX	4	RS232_1_RTS
5	RS232_1_TX	6	RS232_1_CTS
7	TP_RS232_1_DTR	8	TP_RS232_1_RI
9	GND	10	N.C

■ J11: CAVIUM JTAG

Pin	Signal Name	Pin	Signal Name
1	EJTAG_TRST_L	2	GND

3	JTAG_TDI	4	GND
5	EJTAG_TDO	6	GND
7	JTAG_TMS	8	GND
9	JTAG_TCK	10	GND
11	EJTAG_RST_OD_L	12	N.C
13	EJTAG_DINT	14	VDD_3V

- J12: System FAN Connector

Pin	Signal Name
1	GND
2	VDD_12V
3	N.C

- J13: +5V & +12V Power Connector (Only Output)

Pin	Signal Name
1	VDD_12V
2	GND
3	GND
4	VDD_5V

- J14: Battery Connector

Pin	Signal Name
1	VBAT
2	GND

2.4 The Chassis

The system is integrated in a 1U desktop chassis (***Fig. 2-1, Fig. 2-2***). On the front panel you will find a Power / HDD / Ethernet LED.

Fig. 2-1 *Front view of the chassis*

Fig. 2-2 *Rear view of the chassis*

2.5 Open the Chassis

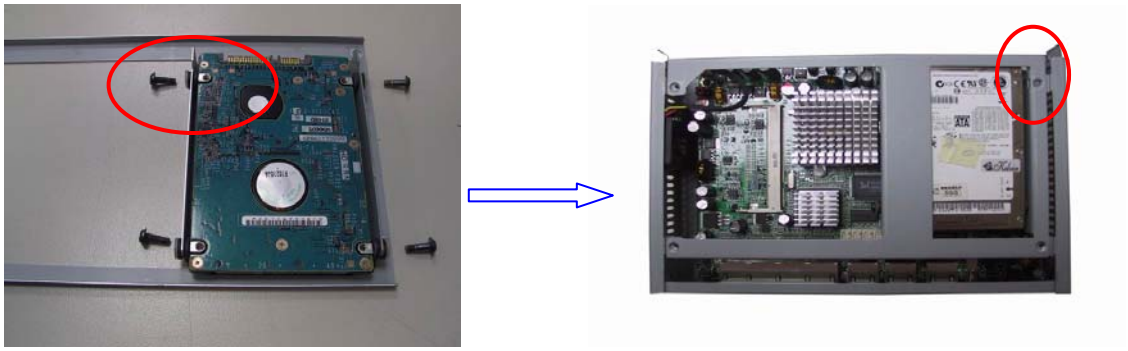
Loosen the 3 screws of the chassis, two are on the right/left side and one is on the bottom side then to remove the top cover

The top cover can be removed from the base stand

2.6 Hard drive Install

The CAM-0100 system has supported SATA HDD function, please follow steps to install SATA HDD drive.

1. Use 4 screws to secure the drive into the hard drive bracket
2. Use 4 screws to secure the bracket into the chassis



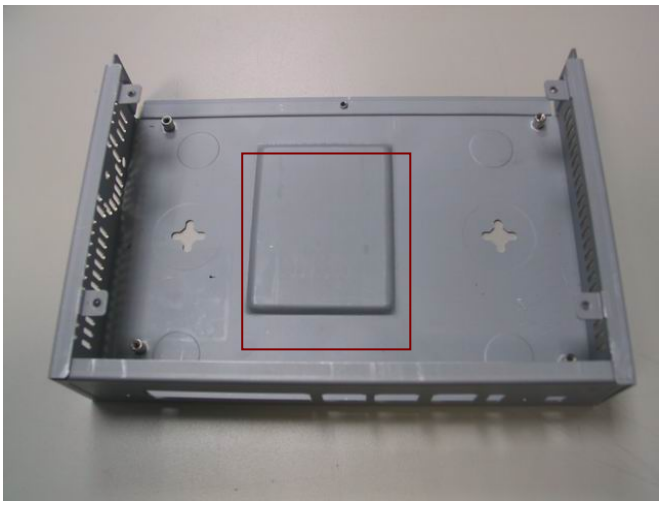
* Note: Fanless models do not supported

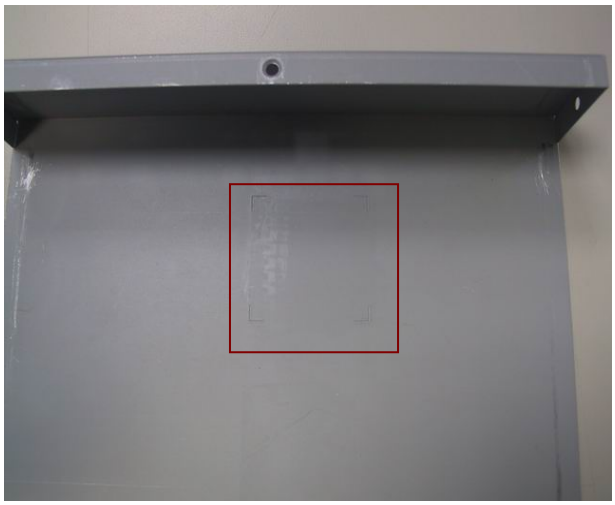
2.7 Thermal Pad Install

The CAM-0100 system has supported fanless type, please follow steps to install thermal pad.

1. To clean the top and bottom chassis before install thermal pad
2. These thermal pad are high performance material, please do not touch pad directly by hand
3. There are two thermal pad, 80*60mm and 40*40mm,

   The big one is for bottom side use (between PCBA and chassis), and the other is for top side use (between top side and CPU heatsink).



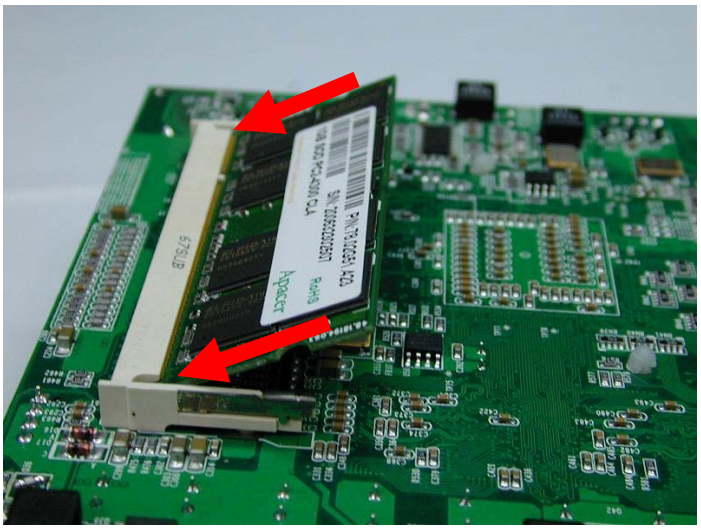


2.8 Remove and Install DIMM

Follow these steps to upgrade RAM module:

Make sure to unplug the power supply before adding or removing DIMMs or other system components. Failure to do so may cause severe damage to both the motherboard and the components.

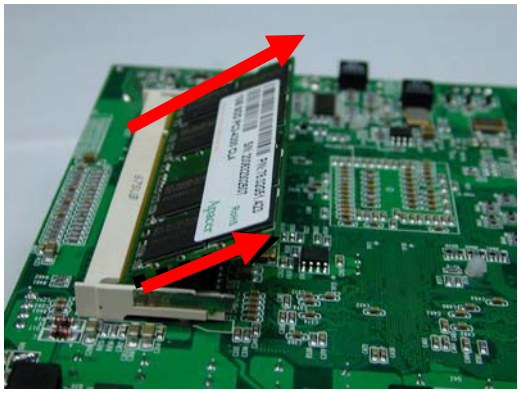
1. Obliquity inserts the DIMM into the socket and depresses DIMM until the retaining clips back in place



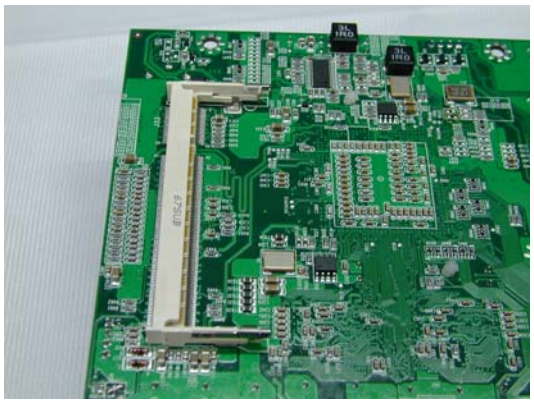
A DDR DIMM is keyed with a notch so that it fits in only one direction.
DO NOT force a DIMM into a socket to avoid damaging the DIMM.

Follow these steps to remove a DIMM:

1. Pull the retaining clips of DIMM socket simultaneously to unlock the DIMM



2. Remove the DIMM from the socket

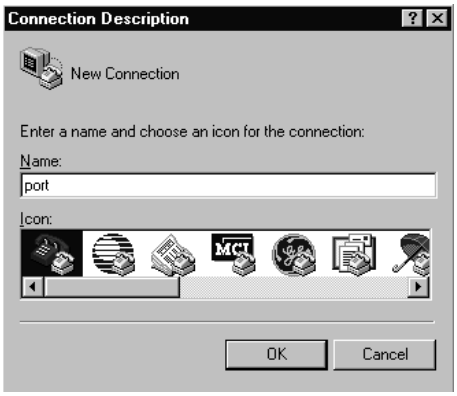


Connection Using Hyper Terminal

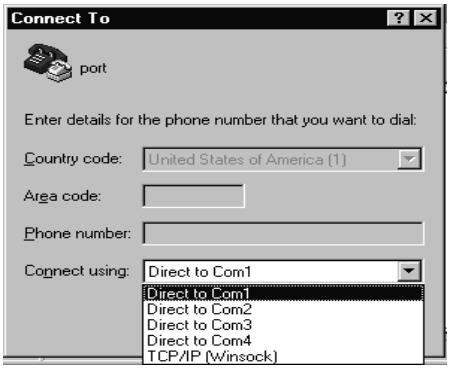
To access CAM-0100 via the console, Hyper Terminal is one of many choices. Follow the steps below for the setup:

***Note**: Terminal software may need to update for correct console output.*

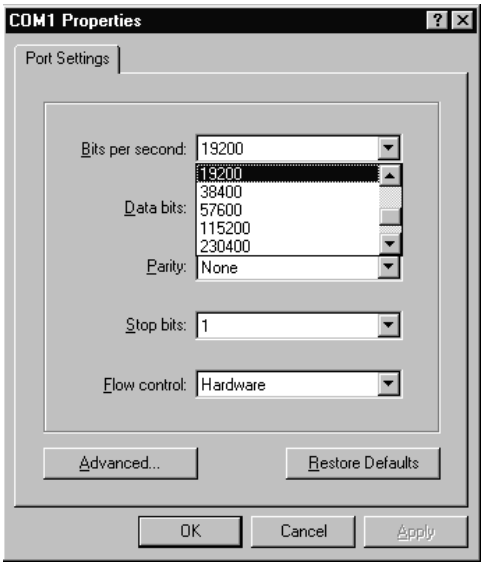
1. Execute HyperTerminal under C:\Program Files\Accessories\HyperTerminal
2. Enter a name to create new dial



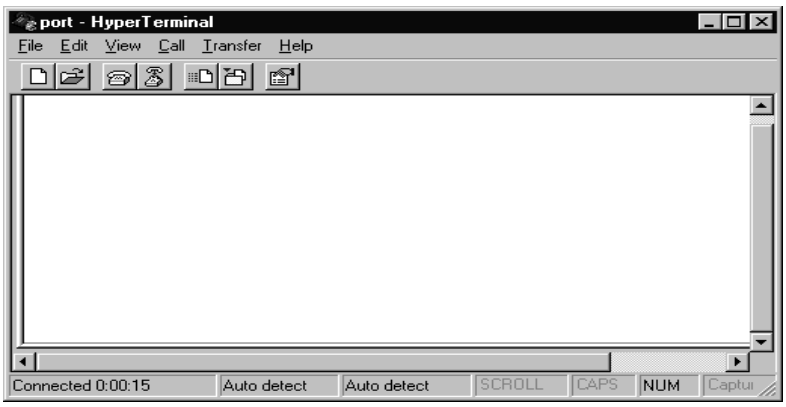
3. For the connection settings, make it Direct to Com1.



4. Please make the port settings to Baud rate 115200, Parity None, Data bits 8, Stop bits 1



5. Turn on the power of CAM-0100 system, after following screen was shown:



This is the end of this section. If the terminal did not port correctly, please check the previous steps.

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Chapter 3 Boot-Loader Setting

3.1 Boot-Loader Information

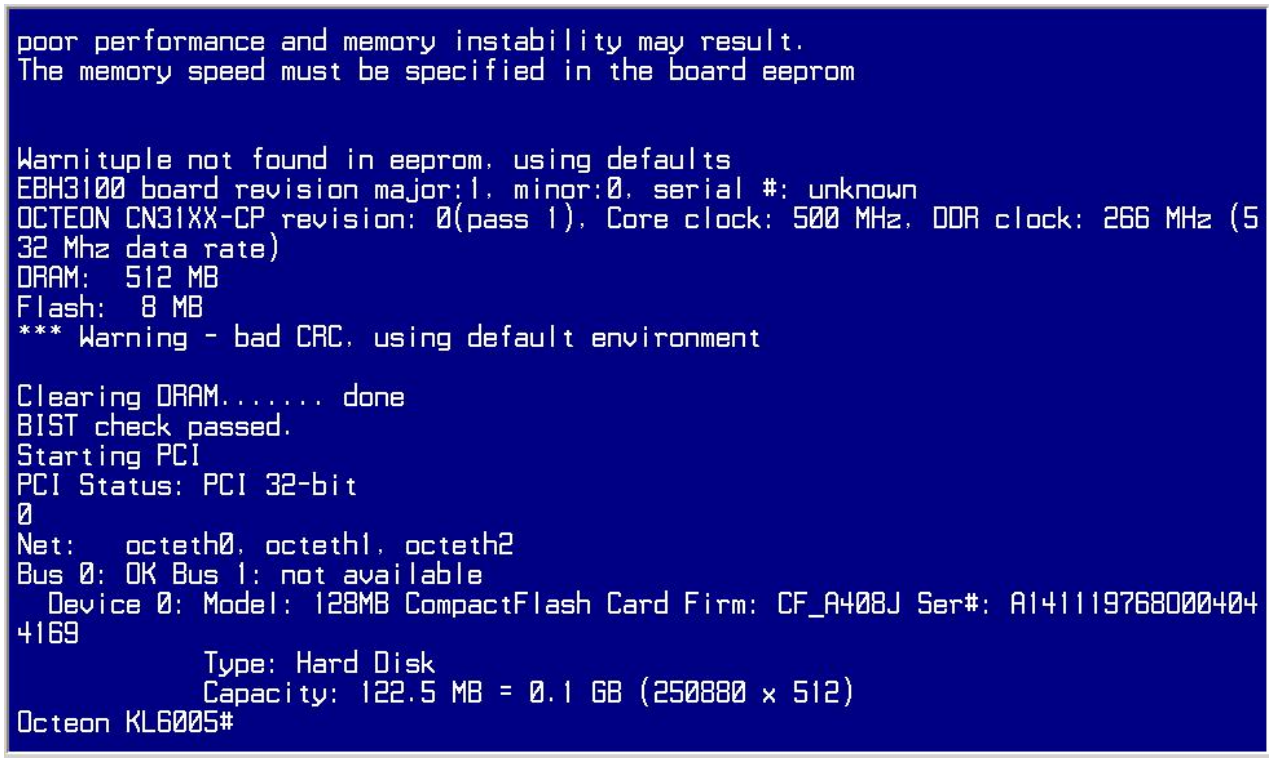
After you boot the system, the Boot-Loader information (as figure below) will appear on the screen.
Key messages will be shown on screen as following

U-boot : Display the U-boot version and built time

DRAM Information : Detect the DRAM clock and size

CF card Profile : Detect the CF card model and capacity

LAN : Display LAN port status of CAM-0100 system


poor performance and memory instability may result.
The memory speed must be specified in the board eeprom
Warnituple not found in eeprom, using defaults
EBH3100 board revision major:1, minor:0, serial #: unknown
OCTEON CN31XX-CP revision: 0(pass 1), Core clock: 500 MHz, DDR clock: 266 MHz (5
32 Mhz data rate)
DRAM: 512 MB
Flash: 8 MB
*** Warning - bad CRC, using default environment
Clearing DRAM..... done
BIST check passed.
Starting PCI
PCI Status: PCI 32-bit
0
Net: octeth0, octeth1, octeth2
Bus 0: OK Bus 1: not available
Device 0: Model: 128MB CompactFlash Card Firm: CF_A408J Ser#: A141119768000404
4169
Type: Hard Disk
Capacity: 122.5 MB = 0.1 GB (250880 x 512)
Octeon KL6005#

Help menu in Boot Loader

"Help" menu is available handily by typing "help"

```
version - print monitor version
write64    - write 64 bit word to 64 bit address
write64b    - write 8 bit word to 64 bit address
Octeon KL6005#
?       - alias for 'help'
askenv  - get environment variables from stdin
autoscr - run script from memory
base    - print or set address offset
bootelf - Boot from an ELF image in memory
bootoct - Boot from an Octeon Executive ELF image in memory
bootoctelf - Boot a generic ELF image in memory. NOTE: This command does not sup
port
             simple executive applications, use bootoct for those.
bootoctlinux - Boot from a linux ELF image in memory
bootp   using BootP/TFTP protocol
cmp     - memory compare
coninfo - print console devices and informations
cp      - memory copy
crc32   -ation
date    - get/set/reset date & time
dhcp    - invoke DHCP client to obtain IP/boot params
echo    - echo args to consolerom  - EEPROM sub-system
erase   - erase FLASH memory
fatinfo - print information about filesystem
```

```
fatload - load binary file from a dos filesystem
fatloadalloc - load binary file from a dos filesystem, and allocate
          a named bootmem block for file data
fatls   - list files in a directory (default /)
flinfo  - print FLASH memory information
go      - start application at address 'addr'
gunzip  - Uncompress an in memory gzipped file
help    - print online help
hmd     - sensors display
icrc32  - checksum calculation
ide     - IDE sub-system
iloop   - infinite loop on address range
imd     - i2c memory display
imm     - i2c memory modify (auto-incrementing)
imw     - memory write (fill)
inm     - memory modify (constant address)
iprobe  - probe to discover valid I2C chip addresses
isdram  - print SDRAM configuration information
itest    - return true/false on integer compare
loadb   - load binary file over serial line (kermit mode)
loop    - infinite loop on address range
md      - memory display
mii     - MII utility commands
mm      - memory modify (auto-incrementing)
```

```
mtest   - simple RAM test
mw      - memory write (fill)
namedalloc    - Allocate a named bootmem block
namedfree    - Free a named bootmem block
namedprint    - Print list of
nm      - memory modify (constant address)
pci     - list and access PCI Configuraton Space
ping    - send ICMP ECHO_REQUEST to netwointenv- print environment variables
protect - enable or disable FLASH write protection
rarpboot- boot image via network using FTP protocol
read64    - read 64 bit word from 64 bit address
read64b    - read 8 bit word from 64 bit address
read_cmp    - read and compare memory to val
reset   -erform RESET of the CPU
run     - run commands in an environment variable
saveenv - save environment variables to persistent storage
setenv  - set environment variables
sleep   - delay execution for some time
tftpboot- boot image via network using TFTP protocol
tlv_eeprom  - EEPROM data parsing for ebt3000 board
version - print monitor version
write64    - write 64 bit word to 64 bit address
write64b    - write 8 bit word to 64 bit address
Octeon KL6005#
```

3.2 Key Commands in Boot-Loader

Fatls –

Function: List files in directory

When to use: To find the file in the CF card as “dir” command

Usage : fatls <interface> <dev[:part]> [directory]

Ex: #fatls ide 0

Fatload –

Function: Load binary file from a DOS file system

When to use: Update boot-loader or running OS or running test tool

Usage : fatload <interface> <dev[:part]> <addr> <filename> [bytes]

Ex: #fatload ide 0 $loadaddr ipfw

Bootoct –

Function: Boot from an Simple Executive ELF image in memory

When to use: Running Simple Executive

Usage : bootoct <addr> coremask=****

Ex: bootoct $loadaddr coremask=ffff

Bootoctl –

Function: Boot from a Linux ELF image in memory

When to use: When you need to execute Linux image

Usage : bootoctl $loadaddr coremask=****

Ex: bootoctl $loadaddr coremask=ffff

Hmd –

Function: Sensors display (Caswell)

When to use: When you want to monitor system H/W status

Usage : #hmd

Run –

Function: Run commands in an environment variable

When to use: Want to update boot-loader or running Linux

Usage : run linux_cf or run bootloader_update

Reset –

Function: Perform reset of the CPU

When to use: Want to warm boot the system

Usage : reset

3.3 Hardware Monitor in Boot-Loader

The boot-loader support H/W monitor function

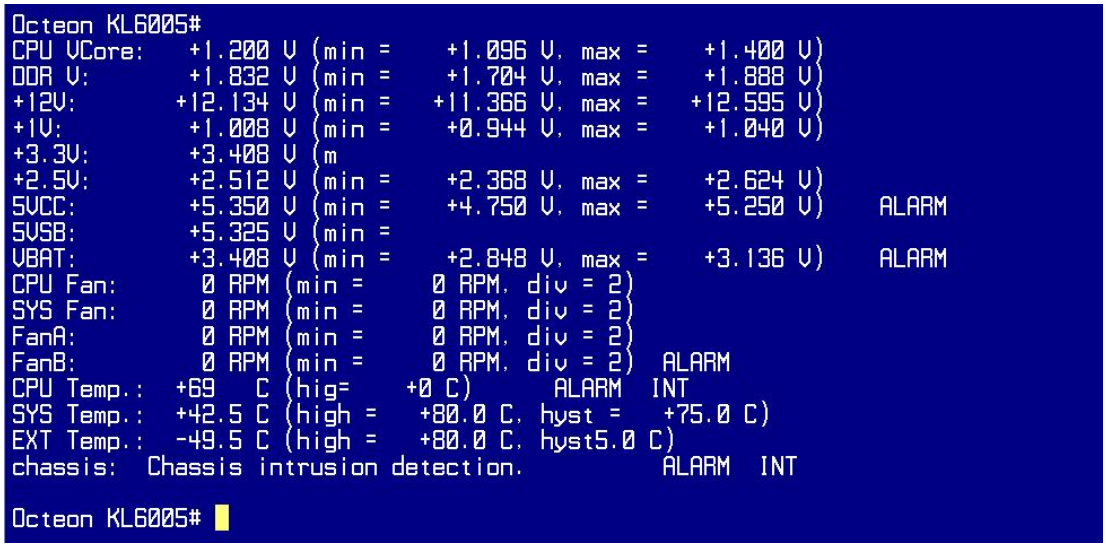
Typing “hmd” on command line then will display current H/W status of the system

FAN1; FAN2; FAN3; FAN4 can detect FAN rotational speed

Temp1 can detect CPU temperature

Temp2 can detect system temperature

Temp3 not connected thermal sensor normally


Octeon KL6005#
CPU VCore: +1.200 V (min = +1.096 V, max = +1.400 V)
DDR V: +1.832 V (min = +1.704 V, max = +1.888 V)
+12V: +12.134 V (min = +11.366 V, max = +12.595 V)
+1V: +1.008 V (min = +0.944 V, max = +1.040 V)
+3.3V: +3.408 V (m
+2.5V: +2.512 V (min = +2.368 V, max = +2.624 V)
5VCC: +5.350 V (min = +4.750 V, max = +5.250 V) ALARM
5VSB: +5.325 V (min =
VBAT: +3.408 V (min = +2.848 V, max = +3.136 V) ALARM
CPU Fan: 0 RPM (min = 0 RPM, div = 2)
SYS Fan: 0 RPM (min = 0 RPM, div = 2)
FanA: 0 RPM (min = 0 RPM, div = 2)
FanB: 0 RPM (min = 0 RPM, div = 2) ALARM
CPU Temp.: +69 C (hig= +0 C) ALARM INT
SYS Temp.: +42.5 C (high = +80.0 C, hyst = +75.0 C)
EXT Temp.: -49.5 C (high = +80.0 C, hyst5.0 C)
chassis: Chassis intrusion detection. ALARM INT
Octeon KL6005#

3.4 Boot-Loader Update

Follow below steps to update Boot-loader

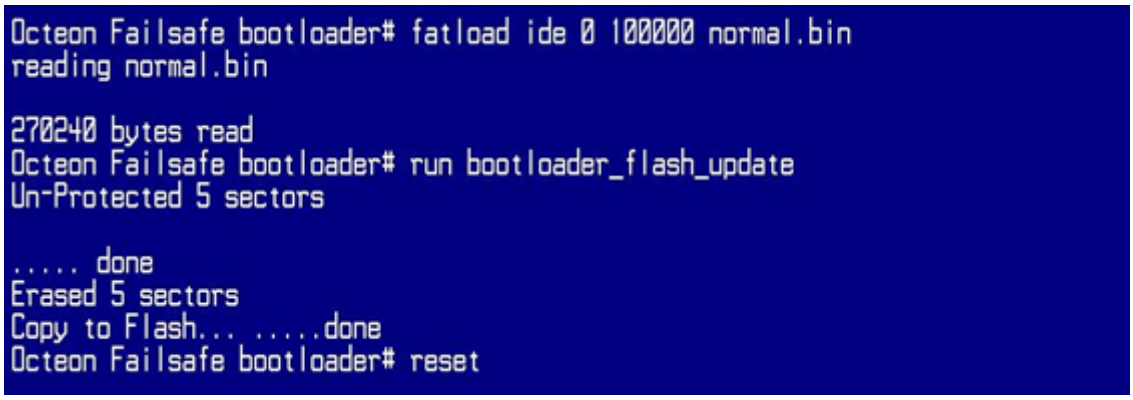
A. Make sure the normal.bin file has been saved to CF card

B. Typing “#fatload ide 0 $loadaddr normal.bin”

C. Typing “#run bootloader_flash_update”

D. After update finishe, typing “reset” and press enter

F. Boot-loader update finished


Octeon Failsafe bootloader# fatload ide 0 100000 normal.bin
reading normal.bin
270240 bytes read
Octeon Failsafe bootloader# run bootloader_flash_update
Un-Protected 5 sectors
..... done
Erased 5 sectors
Copy to Flash... .....done
Octeon Failsafe bootloader# reset

Chapter 4 System Overview

4.1 System Memory Information

DRAM Controller (LMC)
The LMC is fully programmable to support the JEDEC DDR2 SDRAM specification (refer to JEDEC standard: DDR2 SDRAM Specification JESD79-2B (Revision of JESD79-2) January 2005). The LMC has a 32/16-bit-wide interface (36/18 bits wide with optional SECDED ECC), and can architecture support up to 16GB of SDRAM with date rates of up to 667 MHz
There is a single address bus shared by all the DIMMs/parts

Main Memory DRAM Addressing:
All cached DRAM memory resides in an architected 36-bit address space that is in the lowest physical addresses. The first CN50XX implementation can contain up to 16GB of physical addresses available in the following physical address ranges

DR0: 0x0 0000 0000 0000 to 0x0 0000 0FFF FFFF = low 256MB of SDRAM
DR1: 0x0 0004 1000 0000 to 0x0 0004 1FFF FFFF = mid 256MB of SDRAM
DR2: 0x0 0000 2000 0000 to 0x0 0003 FFFF FFFF = upper 15.5GB of SDRAM

With 256MB of SDRAM or less, only DR0 is present.
With 256MB - 512MB of SDRAM, DR0 and DR1 are present
With more than 512MB of SDRAM, DR0 and DR1 are present in entirety; and the lower portion of DDR2 is present, according to the amount of SDRAM attached

4.2 System Watchdog Information

A watchdog timer is a computer hardware timing device that triggers a system reset if the main program, due to some fault condition, such as a hang, neglects to regularly service the watchdog. The intention is to bring the system back from the hung state into normal operation.

CAM-0100 features a watchdog timer that resets the CPU or generates an interrupt if the processor stops operating for any reason. This feature ensures system reliability in industrial standalone or unmanned environments.

Location: JP6
Pin Define:

Pin	Function
1-2 Short	Enable WDT Reset (When WDT Expires) ★
1-2 Open	Disable WDT Reset

4.3 SDK Patch Information

Since some hardware circuit design is difference between Caswell board and OCTEON board. Caswell will provide software patch file for OCTEON SDK used

This file will explain how to install Caswell SDK patch, including basic building procedure and advanced building procedure. After patching the original OCTEON SDK, Caswell related board could have their proper customized configurations. The patch files cover Boot loader, Simple Executive lib and Linux kernel, for more details please check readme document in the patch file.

1. How to install:

Make sure you have the original Cavium Octeon SDK sources.
Copy or move the original SDK to a suitable path(say the path is <SKD_DIR>) and select a CASWELL target model you want to bring up (say is <CASWELL_MODEL>).
All the supporting models can be obtained by run:
"sh auto_patching.sh -h" or "sh auto_patching.sh help"

Then you could assign above two parameters and run this auto patching script:
"sh auto_patching.sh <SKD_DIR> <CASWELL_MODEL>"
example: "sh auto_patching.sh /opt/OCTEON-SDK_1_8_1_294 capk-0100nd"

The patching result would be showed in the terminal. If done, the
current <SKD_DIR> could contain the CASWELL software updating code.

2. Bootloader

In image/u-boot, we have been putting the bootloader binary into dedicated version directory. You could simply get one there and do the bootloader upgrading.

3. Linux Kernel

3.1 Basic building procedure:

Enter the linux folder and run:
"make kernel"
"make strip"

3.2 Advanced building procedure:

Indeed, all of the <CASWELL_MODEL> share the same kernel code base. So, you could use "make menuconfig" to pick up a suitable configuration to build your new kernel image. We will add the 'CA Patch Support' item under configuration table and list how to configure it in the document "OCTEON_SDK181_CASWELL_RELEASE_NOTE.pdf".

4.4 By-Pass Driver Information

CAM-0100 has supported By-Pass function. It is follow Caswell By-Pass Gen1.5 Hardware design rule. All of the feature should be meet By-Pass 1.5 specification.
The By-Pass function is controlled by board jumper setting and software programming Caswell network bypass driver package offer a software configuration solution for Caswell network bypass modules. It would contain the driver, sample scripts and user manual for detail exposition.

[Driver Building]
Make Bypass Control Driver:
Our By-Pass driver can support Intel X86 and Cavium platforms.
For CAM-0100 used you need to do:

```
# cd casswell_bypass/driver
# make KSRC=.. CC=.. TARGET=mips_cavium
```

Ex: #make KSRC=/usr/local/Cavium_Networks/OCTEON-SDK/linux/kernel_2.6/linux
CC=/usr/local/Cavium_Networks/OCTEON-SDK/tools/bin/mips64-octeon-linux-gnu-gcc
LD=/usr/local/Cavium_Networks/OCTEON-SDK/tools/bin/mips64-octeon-linux-gnu-ld
TARGET=mips_cavium

[Installation Steps]:

```
#insmod network-bypass.ko board=CAPK0100ND
```

[Command description]:

The following introduce the bypass driver information get/set API, we use system files to handle those. The easiest way is using “echo” and “cat” to do this. Sure, the file open and read/write these system file could be also using. **Notice: The bypass hardware implement has several generations. The default function descriptions would focus on generation 2.** And the hardware generation 1.X has some function differences; we list these as below (Table 5). Also, at each command description note, we list the file operation inconsistence there.

Function	By-Pass GEN1.X
BYPASS	1. Only support normal and non-normal mode changing by software. 2. At non-normal mode, we could change open and bypass mode by hardware jumper setting.
BPE	According to hardware jumper setting.
NEXTBOOT	According to hardware jumper setting.

Set BYPASS mode:

Set to Normal:

```
#echo 0 > /sys/bus/i2c/devices/0-002X/bypass0
```

Set to Open:

```
#echo 1 > /sys/bus/i2c/devices/0-002X/bypass0
```

Set to Bypass:

```
#echo 2 > /sys/bus/i2c/devices/0-002X/bypass0
```

*Note: At GEN1.x, we only support normal and non-normal mode change. “echo 2 > …” is invalid and no use.

Get BYPASS mode:

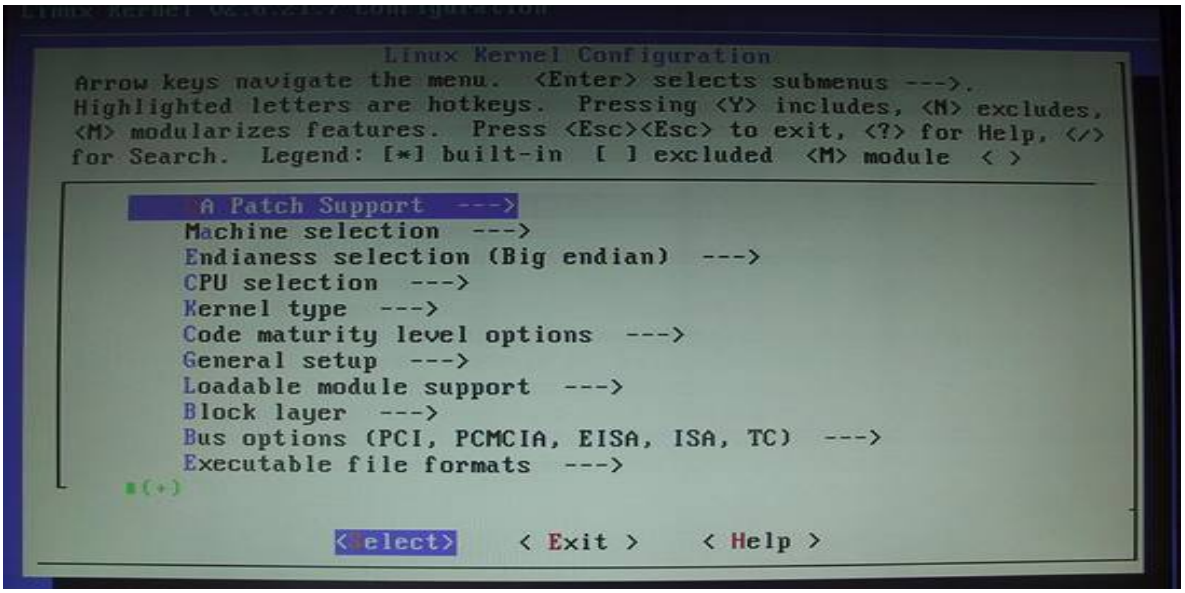
```
#cat /sys/bus/i2c/devices/0-002X/bypass0
```

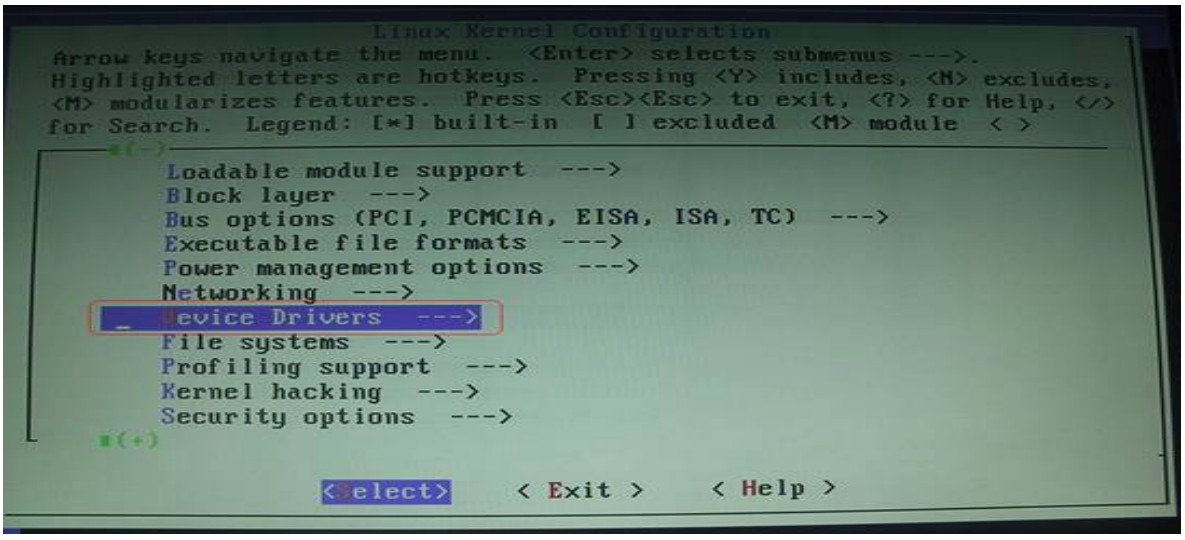
➔ bypass0 value:
0 ➔ normal, 1➔open, 2➔bypass

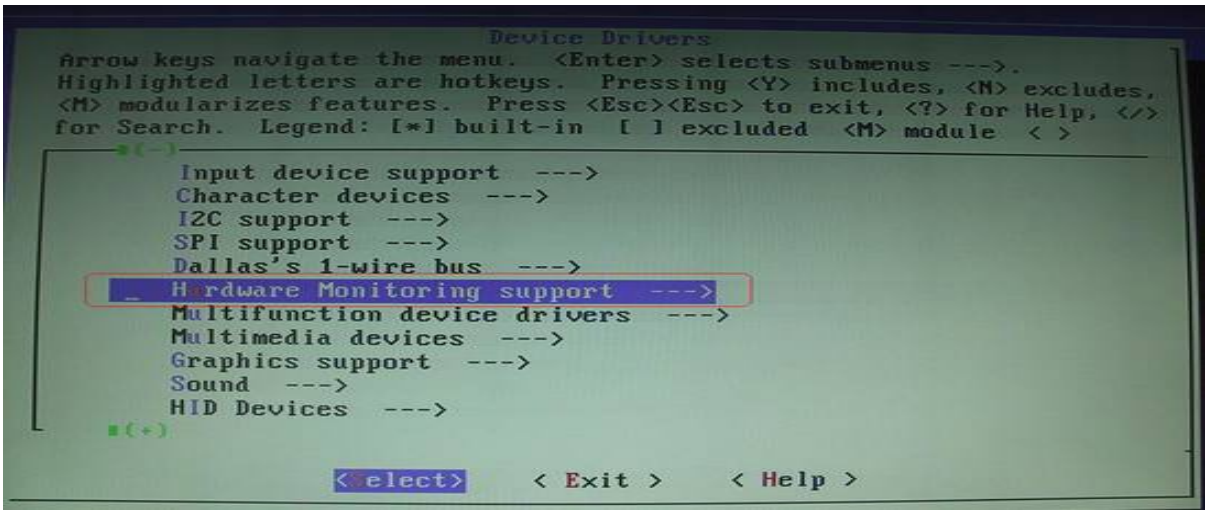
*Note: At GEN1.x, we could only get normal (0) and non-normal (1) status. We may need to check hardware jumper to see the setting is open or bypass.

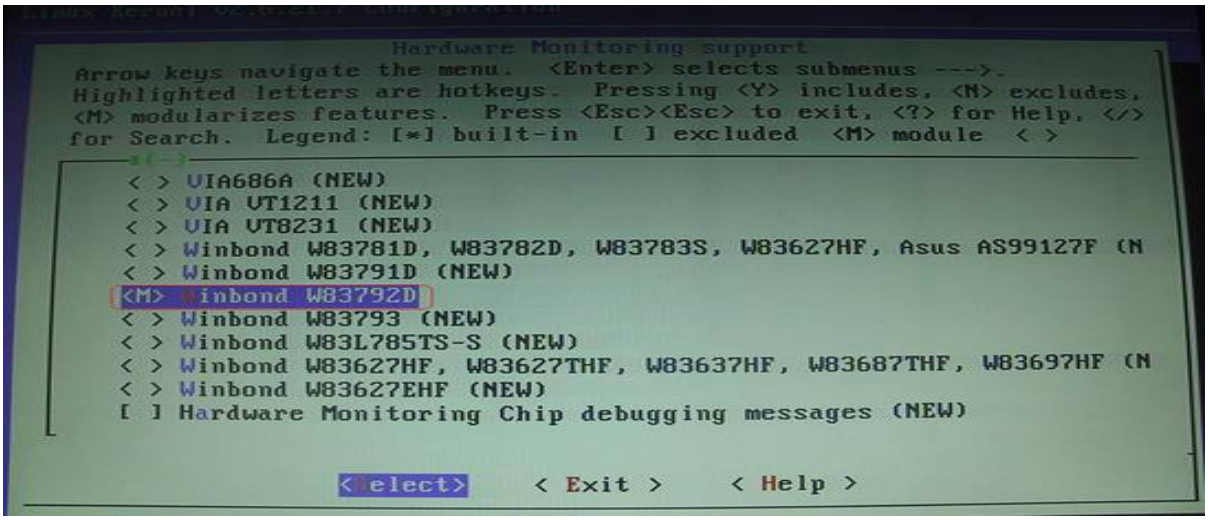
4.5 Hardware Monitor Information

CAM-0100 has hardware monitor feature. It can detect voltage, fan speed, CPU temperature of board function. The chip of hardware monitor is Winbond 83792G and The SDK kernel has support it. Normally, W83792G is work on bootloader of Caswell SDK patch, you can press 'hmd' command under bootloader to know system hardware monitor status but if you want to know status under Linux kernel, you should enable this chip driver via SDK kernel item.
Install hardware monitor driver:
A. patch caswell SDK file
B. make menuconfig to enable W83792
/usr/local/Cavium-Networks/OCTEON-SDK/linux/kernel2.X/linux/


Linux Kernel Configuration
Arrow keys navigate the menu. <Enter> selects submenus --->.
Highlighted letters are hotkeys. Pressing <Y> includes, <N> excludes,
<M> modularizes features. Press <Esc><Esc> to exit, <?> for Help, </>
for Search. Legend: [*] built-in [ ] excluded <M> module < >
A Patch Support --->
Machine selection --->
Endianess selection (Big endian) --->
CPU selection --->
Kernel type --->
Code maturity level options --->
General setup --->
Loadable module support --->
Block layer --->
Bus options (PCI, PCMCIA, EISA, ISA, TC) --->
Executable file formats --->
Select
< Exit >
< Help >


Linux Kernel Configuration
Arrow keys navigate the menu. <Enter> selects submenus --->.
Highlighted letters are hotkeys. Pressing <Y> includes, <N> excludes,
<M> modularizes features. Press <Esc><Esc> to exit, <?> for Help, </>
for Search. Legend: [*] built-in [ ] excluded <M> module < >
Loadable module support --->
Block layer --->
Bus options (PCI, PCMCIA, EISA, ISA, TC) --->
Executable file formats --->
Power management options --->
Networking --->
Device Drivers --->
File systems --->
Profiling support --->
Kernel hacking --->
Security options --->
Select
< Exit >
< Help >


Device Drivers
Arrow keys navigate the menu. <Enter> selects submenus --->.
Highlighted letters are hotkeys. Pressing <Y> includes, <N> excludes,
<M> modularizes features. Press <Esc><Esc> to exit, <?> for Help, </>
for Search. Legend: [*] built-in [ ] excluded <M> module < >
Input device support --->
Character devices --->
I2C support --->
SPI support --->
Dallas's 1-wire bus --->
Hardware Monitoring support --->
Multifunction device drivers --->
Multimedia devices --->
Graphics support --->
Sound --->
HID Devices --->
<Select> < Exit > < Help >


Hardware Monitoring support
Arrow keys navigate the menu. <Enter> selects submenus --->.
Highlighted letters are hotkeys. Pressing <Y> includes, <N> excludes,
<M> modularizes features. Press <Esc><Esc> to exit, <?> for Help, </>
for Search. Legend: [*] built-in [ ] excluded <M> module < >
< > VIA686A (NEW)
< > VIA VT1211 (NEW)
< > VIA VT8231 (NEW)
< > Winbond W83781D, W83782D, W83783S, W83627HF, Asus AS99127F (N
< > Winbond W83791D (NEW)
<M> Winbond W83792D
< > Winbond W83793 (NEW)
< > Winbond W83L785TS-S (NEW)
< > Winbond W83627HF, W83627THF, W83637HF, W83687THF, W83697HF (N
< > Winbond W83627EHF (NEW)
[ ] Hardware Monitoring Chip debugging messages (NEW)
<Select> < Exit > < Help >

C. make Linux kernel

4.6 System GPIO Information

CAM-0100 has GPIO pin header on the board. OCTEON SDK also can support GPIO function. Caswell_util_octeoin-gpio package is a useful tool for set/get Cavium OCTEON GPIO configuration. About the detail usage, please refer to the octeon-gpio_util help menu.
There are two files in the utility package. The octeon-df_test is a factory default setting sample for Cavium Octeon. It will present the GPIO7 setting to decide if user push the factory reset-default button. You could follow the sample code to implement system default function.
The octeon-gpio_util is a gpio function control sample. If you want to implement to your system, Please contact technical engineer for detail pin definition of CAM-0100.
The above two utilities is based on Caswell Octeon SDK patch, they all use kernel ioctl to pass the parameter. Please make sure your kernel have been patched before running these tools.

Make GPIO utility:
#cd caswell_util_octeon-gpio
#make CC=/usr/local/Cavium_Networks/OCTEON-SDK/tools/bin/mips64-octeon-linux-gnu-gcc